



*U.S. Army Space and Missile Defense Command/
Army Forces Strategic Command*



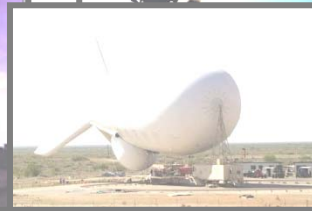
*Migration of Joint Integrated Air and Missile Defense to
Net-Centric Warfare*

Using Architecture Products for Web Services Development Coordination

Briefing to DoD Enterprise Architecture Conference

Unity of Effort – Readiness for Action – Mission Success!

10-14 May 2010



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“Secure the High Ground”



BLUF

(Bottom Line Up Front)

USASMDC/ARSTRAT:

- Conducted Survey of Joint IAMD related web services that are operational or planned. Activity conducted for USSTRATCOM and in coordination with JIAMDO. (67 web services identified)
- Used IAMD Architecture Artifacts to assess the IAMD related web services. (197 IAMD Architecture Activities Matched)
- Propose to coordinate an assessment of the IAMD Critical Gaps using Architecture Artifacts to determine the best ROI for web services implementation to the Warfighter.

IAMD Architecture Effective Tool for Migration to Net-Centric Warfare

IAMD = Integrated Air and Missile Defense; **JIAMDO** = Joint IAMD Org.; **ROI** = Return on Investment

“Secure the High Ground”

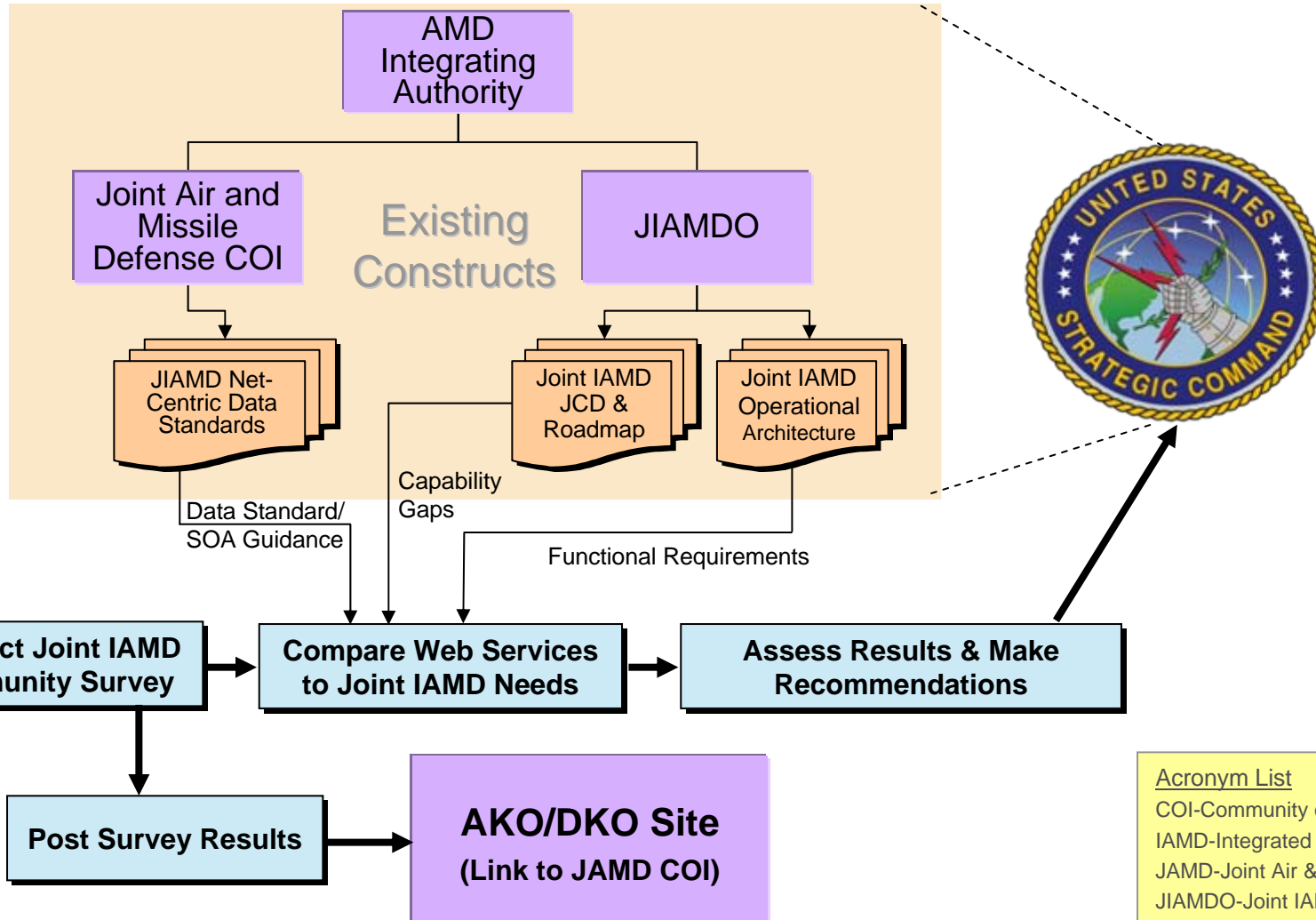


Agenda

- Web Services Survey (WSS) Approach / Products
- Initial Survey Findings / Status
- Use of IAMD Architecture Artifacts
- Assessment Approach / Products
- Initial Assessment Findings
- Benefits of JIAMD Web Services Coordination
- Summary Findings and Recommendations



Web Services Survey / Assessment Approach



- Acronym List**
- COI-Community of Interest
 - IAMD-Integrated Air & Missile Defense
 - JAMD-Joint Air & Missile Defense
 - JIAMDO-Joint IAMD Organization
 - POR-Program of Record



Initial Survey Findings

- More Knowledge of SOA / WS Exist at the Program or Lab Level
- Survey Served as Forcing Function
 - Some organizations did web services planning in response to the survey
 - Some programs or labs coordinated their responses (self-synchronization)
 - Numerous conversations regarding the benefits of the SOA/WS approach
- Some WS Appear to be 'Tightly Coupled' to Legacy HW and/or SW
- PORs and Labs are Developing Prototype and Operational WS
- Unclear Where Current WS Developments Link to Requirements* / Gaps

67 Responses for JIAMD-related Web Services included: Command and Control; Airspace Control Measures; Situational Awareness; Sensor Integration; etc.

*Assessment Purpose

Respondent data cut-off date for information: 30 Oct 09.



JIAMD Web Service Status and Fielding

Current Status

Status (i.e. Operational, Planned, On going Pilot)	Number in each Category
Operational and/or under testing now	19
Pilot / Prototype / Production	24
Advanced Concept Exploration (ACE) Initiative	5
Planned / Concept	18
Phase II SBIR	1
	67

Fielding or Projected IOC

Estimated Date (year) of IOC **	IOC number by year
2008	14
2009	7
2010	15
2011	1
2012	14
2013	0
2014	1
2015	2
Other	3
TBD - ????	10
TOTAL	67

** Survey requested IOC month and year – insufficient data available for month summary



Web Service Communications Means Reported

What communications means does this web service plan to use for information exchange?	Responses for that communications means
Local Access Only	XX
NATO General Purpose Communications System (NGCS)	XX
SIPRNET	XX
SIPRNET, Tactical Internet	XX
SIPRNET, JWICS	XX
SIPRNET, other TBD	XX
Tactical Internet	XX
TCP/IP, HTTP, SOAP; email	XX
TOC LAN (not over wireless)	XX
Data Not Provided	XX
Total	~ 67
All SIPRNET References	~ 43



Web Service Data Protocols Reported

What Protocol or data set does the web service use to exchange data (e.g. MILSTD 6016 or UCORE)?	Number of web services reporting the use of this protocol
Air Operations (AO) COI-defined metadata	XX
Air Operations COI-defined metadata; moving to RSS Service-TBMCS 1.1.3 SP 21	XX
Common IAMD XML Schema (CIXS) [multiple versions or modifications]	XX
Common Message Format (CMF) (one will migrate to Mil STD 6018)	XX
Distributed Common Ground System (DCGS) Interface Metadata Catalog	XX
Digital Aeronautical Flight Info File (DAFIF)	XX
GSIN XML Schema	XX
Keyhole Markup Language (KML)	XX
Modifies BXS, WSDL/SOAP	XX
SOAP/XML - Fire Support Schema used for this function	XX
Strike Schema, UCORE	XX
TBD / Undecided	XX
Ucore	XX
USMTF(2000/2004), AO COI, Adat-P3, TMBCS 1.1.3, CoT (Client)	XX
XML Schema / IPV6 (specific schema not defined / provided)	XX
Data Not Provided	XX
	~ 67

Findings for Protocols Used or Planned for JIAMD Web Services

- 10+ different protocols used/planned
- Some protocols not determined
- Protocol Proportions Approximately:
 - CIXS (or CIXS-Like) 25%
 - AO COI Defined 18%
 - Fire Support Schema 16%
 - DCGS Related 10%

Recommendations to JAMD COI

- Continue / Increase data work with AO COI, Fire Support, and DCGS
- Engage PORs where data is not decided
- JIAMD Programs and Labs migrate to latest version of CIXS
- Federate/Integrate JIAMD data sets



Status

- JIAMD 2009 Web Services Survey is Complete
 - Survey has been Posted on the AKO/DKO
 - Survey Results url: <https://www.us.army.mil/suite/page/623175>
 - Do More JIAMD Web Services Exist?

- JIAMD Web Services Assessment is Complete
 - JIAMD Web Services Mapping to IAMD Architecture (JIAMDO support)
 - Conducted 8 JIAMD Web Services Assessment TIMs with JIAMDO
 - Verified Mappings to IAMD Architecture with PORs and Labs
 - Completing Assessment Findings (all numbers are currently tentative)
 - Assessment Report Final Draft sent to USSTRATCOM 2 April

Assessment can help identify solutions to capability gaps using the IAMD Architecture



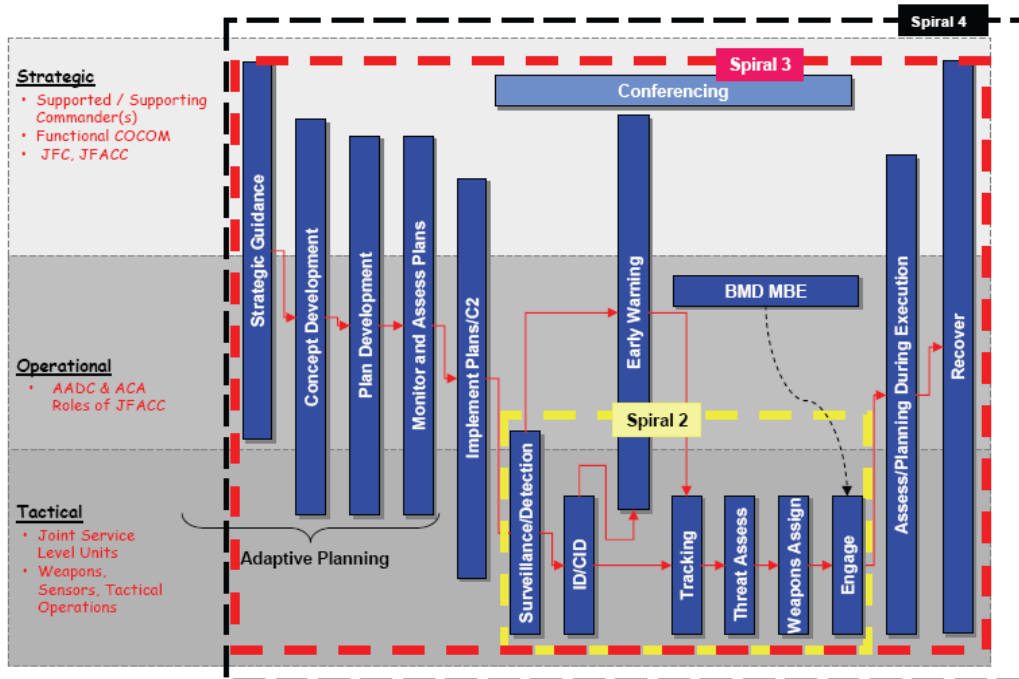
JIAMD Web Services Assessment Use of IAMD Architecture Artifacts

- **OV-3: Operational Information Exchange Matrix** - The OV-3 was utilized in the conduct of the 2009 JIAMD WSS Assessment to map activities and information exchanges to the JIAMD Web Services.
- **OV-5: Operational Activity Model** - The OV-5 was utilized in the conduct of the 2009 JIAMD WSS Assessment to compare JIAMD Web Services functionality to activities.
- **OV-6c: Operational Event Trace Description** –The OV-6c was utilized in the conduct of the 2009 JIAMD WSS Assessment to determine other activities in a thread that may be related to the JIAMD Web Services functionality.



Functional Categories for Mapping Web Services

Operational Scope of IAMD Architecture



Functional Categories

Consolidated to 7

Recommended by JIAMDO Architecture Team

1. Strategic Planning Guidance
2. Develop Concepts and Plans
3. Monitor and Prepare to Execute
4. Surveillance and Detect
5. Track and Identification
6. Battle Manage and Prepare to Execute
7. Assess and Replan

Allowed the assessment team to focus its search for IAMD operational activity matches for each submitted web service.

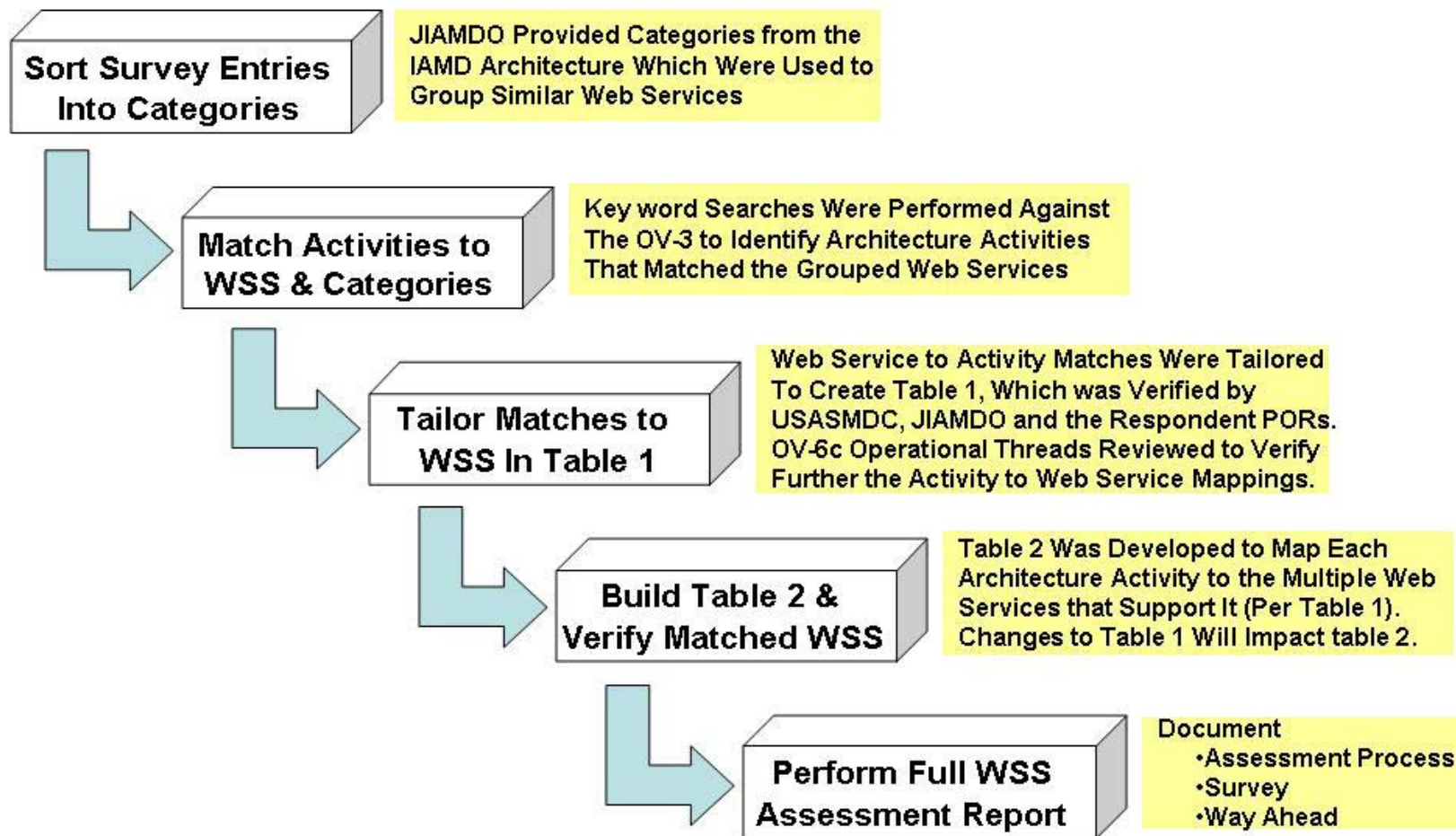


JIAMD Web Services 'Binned' into Operational Categories

Row #	Name of IAMD Web Service	Description of IAMD Web Service (top level)	Organization Developing IAMD Web Service	POC name, email and/or telephone number	Status (i.e. Operational, Planned, On going Pilot)	Date (mo/yr) of Pilot or Experiment and Venue
Ex.	IAMD cross-AOR mission analysis Capability EXAMPLE -->	Provides cross-AOR mission analysis information for an organization or group of organizations related to IAMD planning	ABC Project Office US Army/Navy/AF/MC (list one) City, State	Iam N. Charge iam.charge@us.army.mil (222) 987-1234	PILOT	(05/07) Pilot Demonstrated in local Experiment 5/07
Planning: Strategic Guidance (Original Numerical Sequence Maintained)						
1	ACO Management Service (Airspace v14.3)	Provides the capability to select, insert, update, and delegate airspace data from the TBMCS Air Operations Database (AODB). This includes the capability to retrieve Airspace Control Measures (ACMs), Air Control Orders (ACOs), Airspace Group data, Airspace Usage data, Airspace Type data, and Filter data.	TBMCS 1.1.3 SP7	POC # 1 XXX-XXX-XXXX	Operational	N/A
Web Service #2 Moved to Planning: Monitor & Prepare to Execute						
3	Aircraft Diplomatic Clearances	special cases of clearances needed from air traffic control system for specific missions.	TBMCS 1.1.3 SP7	POC # 3 XXX-XXX-XXXX	Planned	TBD
8	Airspace Web Service (AWS)	AWS implements the TBMCS 1.1.3 AirspaceWebService interface. This interface was implemented as a proof-of-concept to position JASMD to integrate within TBMCS 1.1.3 as the airspace service provider.	AFRL JASMD	POC # 8 XXX-XXX-XXXX	Prototype development complete	TBD
12	Campaign Service	Manages the creation, maintenance, retrieval and deletion of campaigns, phases and planning periods.	NATO ALTBMD PO	POC # 12 XXX-XXX-XXXX	Planned	TBD
35	ISPAN Global Adaptive Planning Collaborative Information Environment (GAP CIE)	Provide STRATCOM net centric environment for contingency planning	STRATCOM/J81; JFCC GS J33	POC # 35 XXX-XXX-XXXX	Operational	N/A
38	JPCOM...	CIWI Web Service implements	...	POC # 38 XXX-XXX-XXXX



JIAMD Web Services to Architecture Assessment Process





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TABLE 1: JIAMD Web Services to OV-5 Activities

Row #	Name of IAMD Web Service	Description of IAMD Web Service (top level)	Status (i.e. Operational, Planned, On going Pilot)	Linkage to IAMD Architecture Via Operational Activity (Activity Number and Title)	Associated Information Exchanges
1	ACO Management Service (Airspace v14.3)	Provides the capability to select, insert, update, and delegate airspace data from the TBMCs Air Operations Database (AODB). This includes the capability to retrieve Airspace Control Measures (ACMs), Air Control Orders (ACOs), Airspace Group data, Airspace Usage data, Airspace Type data, and Filter data.	Operational		
2	Air Battle Plan	Overall plan of the day or the campaign as described in ATO and other messages today	Planned		

Table 1 provided to JAMD COI for data trace to Information Exchanges

"Secure the High Ground"



TABLE 2: OV-5 Activities to JIAMD Web Services

Linkage to IAMD Architecture Via Operational Activity (Activity Number and Title)	JIAMD Associated Web Service Row Number (See Appendix B for WS Row Numbers)
A1.2.4.1 -	34, 35
A1.3.1.1.2.2 --	36
A1.3.1.2.1.1.3 -	6, 9, 17, 18, 19
A1.3.1.2.1.1.4 -	6, 9, 17, 18, 19
A1.3.1.2.1.3.4 -	6, 9, 17, 18, 19
A1.3.1.2.2.2 --	36
A1.3.1.3.1.1.1.3 -	6, 9, 13, 17, 18, 19, 38, 48
A1.3.1.3.1.1.1.4 -	6, 9
A1.3.1.3.1.1.1.3.5 -	6, 9
A1.3.1.3.1.3.1 --	36
A1.3.1.3.2.1 -	1, 8
A1.3.1.3.2.2 -	1, 8
A1.3.1.4.1.1 -	29, 59
A1.3.1.4.1.3 -	38, 48
A1.3.1.4.1.4 -	17, 18, 19
A1.3.1.4.2.3 -	7
A1.3.1.4.3.6 -	7
A1.3.2.1.1.1.1 --	1, 6, 9, 17, 18, 19
A1.3.2.1.1.1.2 --	6, 9, 13, 14, 17, 18, 19
A1.3.2.1.1.1.2.3.1 -	14
A1.3.2.1.1.2.1 -	14

Notional



JIAMD Web Service Assessment Products

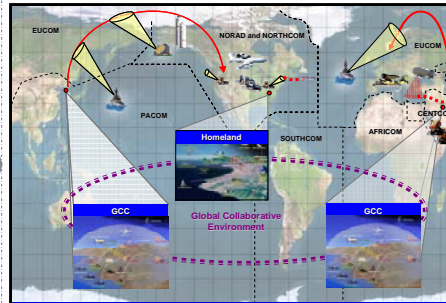
2009-2010
Assessment

JIAMD 2009 WS Survey

- Web Services Responses Include:
 - USAF xx
 - US Army xx
 - US Navy xx
 - ALT BMD (NATO) xx
 - MDA xx
 - STRATCOM xx
 - IBS xx
 - DISA xx
- Total JIAMD Web Svcs. ~ 67

Map
to

IAMD ARCHITECTURE



JIAMD Activities: 544

Also
Done

IAMD Activities Mapped to COCOM Capability Gaps

**GAP
TABLE**

IAMD
Activities

IAMD Capability
Gaps

Next Step: COMPARE

ANSWERS for IAMD Architecture

Table 1 - What IAMD activities are satisfied by each JIAMD Web Service?

Table 2 - What JIAMD Web Services support each IAMD activity?

PLANNING:	xxx
ENGAGE:	xxx
ASSESS:	xxx
Activities Mapped:	~ 197*

*Many activities mapped to more than one category

IAMD Activities Covered by JIAMD Web Services

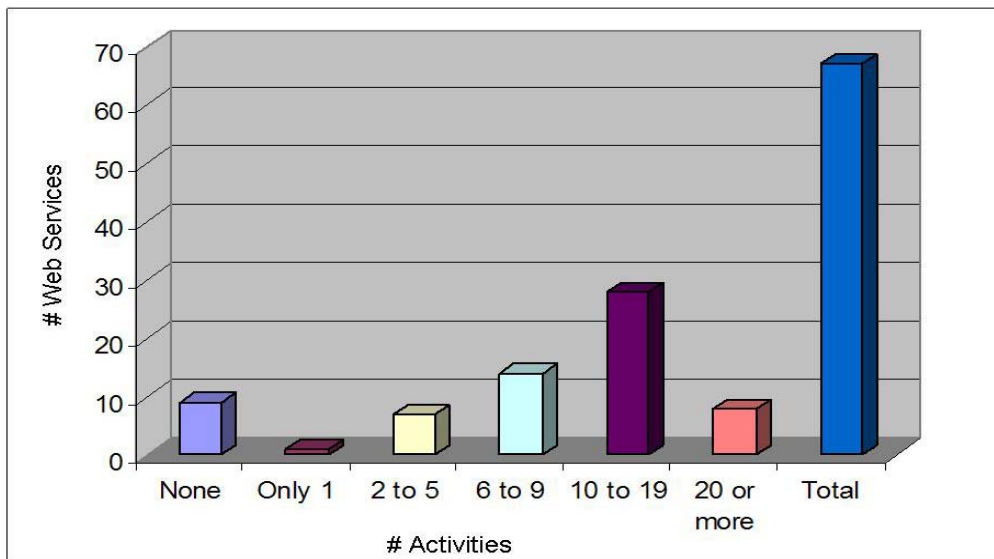
TABLE 1 IAMD Activities

TABLE 2 - Reverse Mapping

**What Web
Services Will
Satisfy JIAMD
Gaps?**



Initial Assessment Findings / Web Services



Web Services Categorized By # Of Related Activities

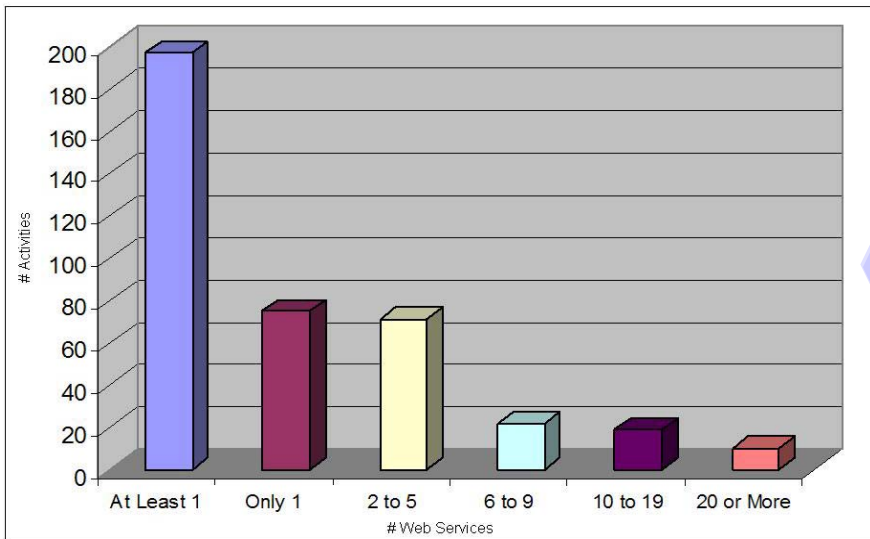
- WS related to no activities: 8
- WS related to only one activity: 1
- WS related to 2 - 5 activities: 7
- WS related to 6 - 9 activities: 14
- WS related to 10 - 19 activities: 28
- WS related to 20 or more activities: 8

- **Top five Web Services with most mapped activities:**
 - ACO Management Service – 38 Activities
 - Friendly Order of Battle Management Service – 37 Activities
 - Threats (EOB) – 25 Activities
 - Mission Planning Foundation System – 24 Activities
 - ISPAN Global Adaptive Planning Collaborative Information Environment – 23 Activities

ACO = Airspace Control Order; EOB = Enemy Order of Battle; ISPAN = Integrated Strategic Planning and Analysis Network



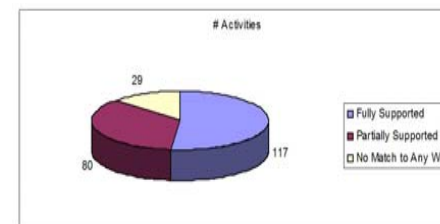
Initial Assessment Findings / Activities



Activities Categorized By # Of Related Web Services

- Activities related to at least one WS - 197
- Activities related to only one WS: 75
- Activities related to 2 - 5 WS: 71
- Activities related to 6 - 9 WS: 22
- Activities related to 10 - 19 WS: 19
- Activities related to 20 or more WS: 10

- **Top five activities with most mappings to JIAMD Web Services:**
 - A2.1.2.3.4 - Publish and Display Air and Ballistic Tracks – 25 WSs
 - A2.1.1.1 - Monitor the Strategic Environment - Supported CDR – 23 WSs
 - A2.1.1.2 - Monitor the Strategic Environment - Supporting CDR – 23 WSs
 - A2.1.1.3 - Monitor Operational Environment – 22 WSs
 - A2.1.1.4.5 - Coordinate Ballistic Missile Surveillance and Tracking Operations – 22 WSs
- Activities assessed as fully supported by at least one WS - 117
- Activities assessed as only partially supported by one or more WS – 80
- Activities assessed as no match from preliminary survey for any WS - 29





Benefits of this Web Services Coordination

1. Risk Reduction Activity for all Joint and Coalition IAMD Programs
2. Reduce Costs of Developing IAMD Capabilities
3. Web Services are Fielded with Interoperability Embedded
4. Better Ability to Map Web Services Capabilities to IAMD Operational Architecture and Minimize Gaps
5. Reduce Duplication in Web Services Development
6. Assist in Identification of Services that Support IAMD from Other COIs
7. Expose the Web Services Planned to the User & Developer Communities Early
8. Expose Web Services Early that are Using Standard Protocols
9. Better Coordination of IAMD Web Services with the DoD Service Directory

JIAMD SOS capabilities to the Warfighter faster, cheaper, more agile, and more capable.



Summary Findings for JIAMD Web Services Coordination

- a. IAMD Architecture artifacts were effective in conducting the assessment of the JIAMD related web services
- b. Activities of the OV-5 were at the appropriate fidelity to conduct the assessment
- c. IAMD Architecture can be used to coordinate the development of web services to provide warfighter capabilities across programs and labs

Limitations

- a. JIAMD related web services descriptions were brief
- b. Implications that duplicate work is underway is not supported by this level of assessment



Recommendations for JIAMD Web Services Coordination

The 2009 JIAMD WSS and assessment have identified areas for future action by the USASMDC/ARSTRAT JIAMD Web Services Forum Coordination Team. These include the following:

- a. **Assess the capability gaps** of the IAMD Roadmap for possible solutions using JIAMD related web services for best Return on Investment (ROI) for joint solutions.
- b. **Continue to monitor and assess the development plans** for the JIAMD related **web services** as they relate to the IAMD Architecture.
- c. **Increase participation** in the JIAMD COI-sponsored **JIAMD Web Services Forum** to better coordinate JIAMD related web services as they relate to the IAMD Architecture.
- d. **Establish a JIAMD Web Services Clearing House** to ensure development of JIAMD related web services are consistent with the IAMD Architecture.
- e. **Continue to coordinate** JIAMD related web service activities with the **Joint C2 efforts** led by USJFCOM for possible joint development opportunities.
- f. **Coordinate and integrate** JIAMD related web services development with the Multi-Service System Engineering Team (**MSSET**).



Points of Contact

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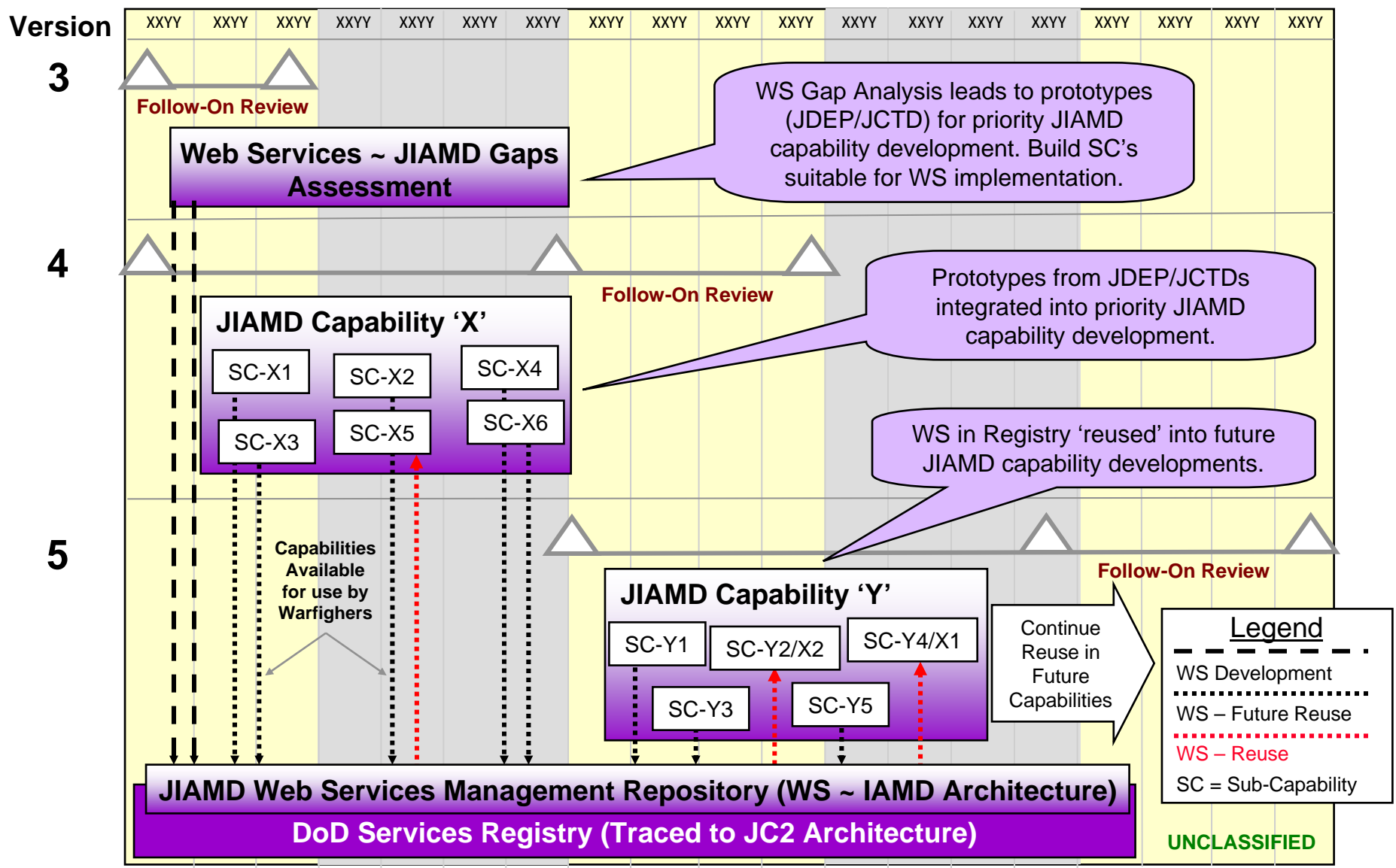


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Back Up

JIAMD Web Services Integration with IAMD Roadmap (U)



UNCLASSIFIED

DRAFT (pending coordination with Roadmap Team)

UNCLASSIFIED